

7.—A Note on Two Small Mammals of the Darwin Area

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A trapping study of the small mammals at Humpty Doo, near Darwin, was carried out from 1956 to 1959. *Phascogale ingrami* was found in the pandanus fringe, the paper-bark fringe and the thorn scrub, while *Melomys cervinipes albiventer* was collected only in the pandanus fringe.

Both small mammals produced young in the wet season, and in *P. ingrami* breeding is probably limited to that period.

It appears that these two small mammals can maintain populations only in habitats where annual fires and floods do not occur.

Introduction

Between November 1956 and March 1959, I spent 15 months at Humpty Doo, on the Adelaide River, about 40 miles south-east of Darwin (131° 15' E; 12° 40' S) in connection with magpie goose studies. During that period I collected some data on the distribution and biology of two small mammals, a marsupial *Phascogale (Planigale) ingrami* (Thomas) and a rodent *Melomys cervinipes albiventer* (Kellogg).

Phascogale ingrami is a small, brown, shrew-like marsupial, one of the smallest of the dasyurids, remarkable for its greatly flattened skull. Its distribution is as yet incompletely known but it is probably restricted to the areas of Northern Australia influenced by the monsoons. Like the true Shrews, *Sorex*, it is actively predaceous, at least in captivity, capable of killing and consuming grasshoppers almost as large as itself.

Melomys cervinipes, a grey-brown Murid the size and shape of a large vole (e.g. *Clethrionomys* sp.), but with a tail as long as the body, is one of the smallest of the scaly-tailed, arboreal rats inhabiting the forests of the Malay Archipelago, New Guinea and Northern Australia.

As in some other Australasian Murids, e.g. *Pseudomys*, *Leggadina*, etc. (Ellerman 1941), there are only four mammae in *M. c. albiventer* females, concentrated at the anal end of the abdomen. The young mice each hold a teat continuously in their mouths until they are two to three weeks old and are dragged about, marsupial-like, by the mother as she moves. Jones (1925) describes a similar state of affairs in the related genus *Leporillus*. A number of races of the species have been recognized along the coast from northern New South Wales to west of Darwin, as well as a number of insular forms, but all previous material of *M. c. albiventer* has been collected at the type locality, Brocks Creek, about 120 miles south of Darwin. My specimens agree with the type description by Kellogg (1945) in every respect, and would,

therefore, extend the known range of the form to include the flood plain of the Adelaide River.

The animals were trapped in Oxford Longworth live traps, generally unbaited on account of the active ant fauna, but in localities expected to yield *M. c. albiventer* the traps were baited with domestic hen laying-pellets. The traps were set five yards apart in a straight line on the ground. Breakback traps, of both rat and mouse sizes, were set from time to time, but no catches were ever made in them.

Both species have been held for some time in captivity. A small *M. c. albiventer* colony has been established at the C.S.I.R.O. Wildlife Survey Section's headquarters in Canberra, but *P. ingrami* has been kept only in Darwin, where individuals have survived for a month on a diet of grasshoppers, raw meat and cod-liver oil. *M. c. albiventer* has been bred on a diet of rabbit food-pellets and green food.

The information collected is incomplete but it may be of interest in view of the present development of the area into irrigated rice farms, with which is associated a gross environmental change, and also because our knowledge of these small mammals still depends on the records of the early collectors, summarised in Troughton (1941).

B. J. Marlow of the Australian Museum, Sydney (where specimens of both animals have been deposited) has kindly checked the identification of both animals. I am grateful to J. Saxby and W. J. Mills for help in the field, and to F. N. Ratcliffe, J. H. Calaby, H. J. Frith and Dr. W. D. L. Ride for their comments on the manuscript.

Environment

Humpty Doo lies in the 60-inch rainfall belt. Most of the rain falls between November and March, the wet season, whereas the rest of the year is relatively dry, with grass fires burning through the drying vegetation in April and May almost every year. Day temperatures reach 90° to 100° F in the wet season and 70° to 80° F in the dry season; night temperatures are somewhat lower, falling below 60° F at times in the dry season.

The flood plain of the Adelaide River at Humpty Doo is sharply delimited from the higher ground that is not subject to inundation during the wet season. The vegetation of this higher ground is a tropical savannah woodland consisting of an open forest of *Eucalyptus* with a shrub layer of varying density. Most of the trapping was done in an area where the trees grew close together, the herb layer being pre-

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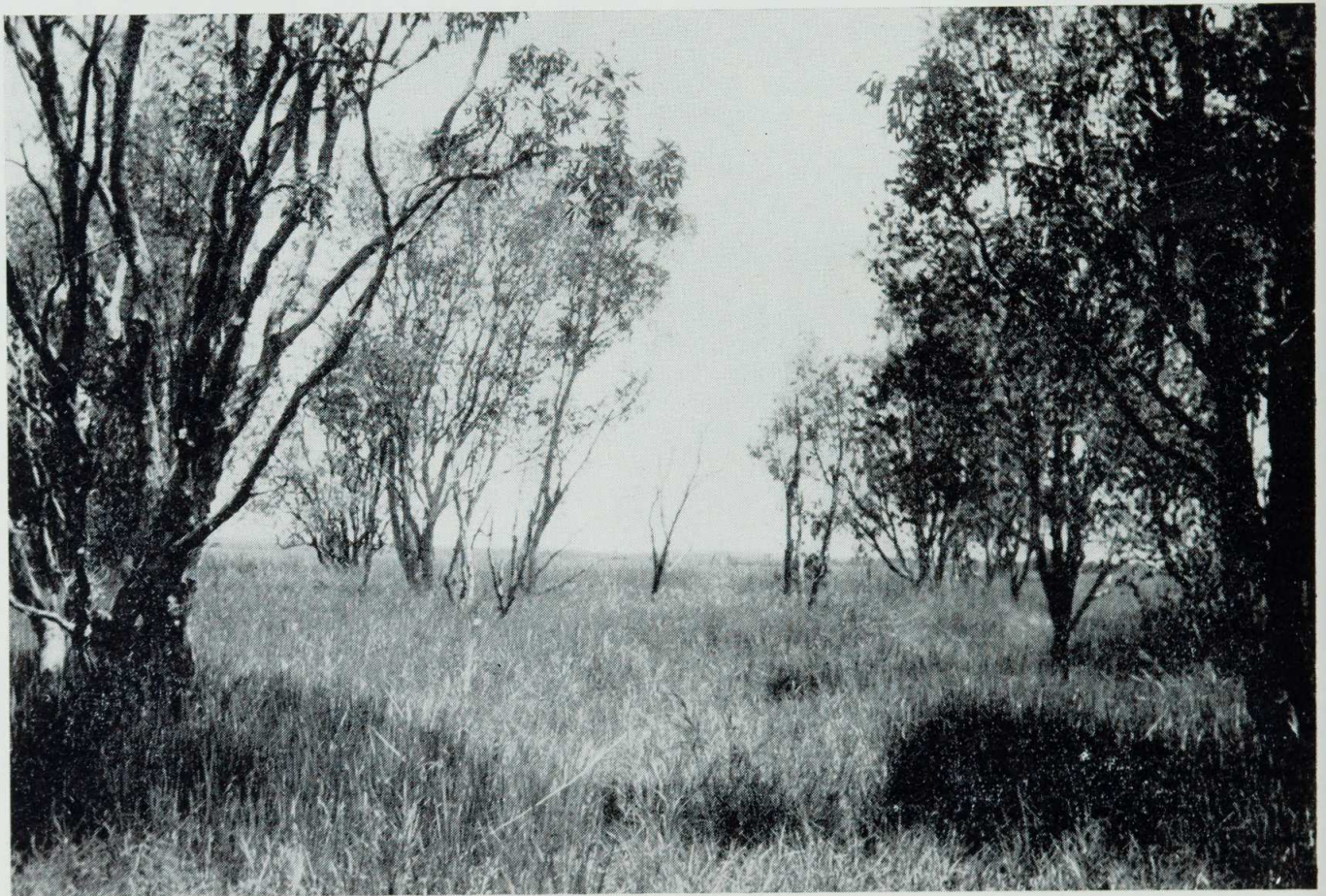


PLATE I
1.—Pandanus fringe.
2.—Paperbark fringe.

sent only in the wet season and shrubs virtually absent.

At the junction of the flood plain and the savannah woodland there is typically a transition zone or fringe dominated, according to local conditions by *Pandanus* or *Melaleuca*. The pandanus fringe is an open association of *Pandanus* and grassland (see Plate I, 1). The paperbark fringe is likewise an open association, of *Melaleuca* and grassland, differing from the true paperbark forest in that a thick herb layer develops (see Plate I, 2).

In addition to savannah woodland, pandanus fringe and paperbark fringe, trapping was also carried out in a fourth habitat, thorn scrub, consisting of isolated patches of *Acacia* and other shrubs with thick undergrowth growing on higher ground in the open plain.

Results

Phascogale

In 1955-1956 H. J. Frith (personal communication) found a number of *P. ingrami* hiding under sacks on a rice levee bank that extended several hundred yards across the flood plain from the pandanus fringe. The plain was flooding rapidly at the time, and the animals had probably been forced by the rising water to leave the vegetation along the foot of the bank, where they had been living.

There are two records for 1956-57, both in February. A pair of *P. ingrami* was collected from under a log lying in thorn scrub, and a

single animal was seen at the base of a pandanus clump when it was chopped down late in the month.

The trapping programme carried out from September 1957 to March 1959 is shown in Table I. It should be noted that whereas in 1957-58 no two habitats were trapped simultaneously, in March 1959 simultaneous trapping was used to compare—

- (1) savannah woodland and pandanus fringe (1-18 March); and
- (2) savannah woodland and paperbark fringe (18-25 March.)

The captures during the two seasons are set out in Table II.

In 1957-58 seven *P. ingrami* were taken in both the pandanus and the paperbark fringes. Although none were trapped in thorn scrub, a single animal was observed there in January 1958. One of the specimens collected in pandanus fringe on March 3, 1958 had been reduced to a skeleton by ants before it was found, so it remained unsexed. Some of the females ate their litters shortly after being taken into captivity, and only two litter sizes were established immediately after capture, one of 12 and another of 8.

In addition to the captures made in March 1959 and presented in Table II, a female *P. ingrami* without a litter was found while undergrowth was being cleared in the pandanus fringe in August 1958 (J. Mills, personal communication.) The weights and measurements of some animals are given in Table III.

TABLE I

Trapping programme for small mammals at Humpty Doo, 1957-1959
Number of trap-nights per month

Habitat	1957		1958				1959		Total
	Sept.	Jan.	Feb.	March	April	May	March 1-18	March 18-25	
Tropical savannah woodland	63	63	0	0	0	0	90	35	251
Pandanus fringe	0	0	126	63	63	189	108	0	549
Paperbark fringe	63	63	126	63	0	126	0	35	476
Thorn scrub	0	0	0	0	63	0	0	0	63

TABLE II

Number of captures of *Phascogale ingrami* per month at Humpty Doo, 1957-1959

Habitat	1957		1958				1959		Total
	Sept.	Jan.	Feb.	March	April	May	March 1-18	March 18-25	
Tropical savannah woodland	0	0	....	....	....	....	0	0	0
Pandanus fringe	....	....	0	2f(L) 1 U	0	1f(B)	2f(L) 2 m	....	5f 1 U 2 m
Paperbark fringe	0	1f(L)	1f(L) 1 m	0	....	0	....	1f(L)	3f 1m
Thorn scrub	....	....	....	....	0	....	....	....	0

(L) = with pouch young or pregnant, (B) = without pouch young, f = female, m = male, U = unsexed.
NOTE.—A male was brought in by one of the farm cats on 4/1/58.

TABLE III

Quantitative data from some *Phascogale ingrami* trapped at Humpty Doo, Darwin

Date of capture	Sex	Details
3/3/58	F	Naked pouch young 0.5 cm long
9/3/58	F	Weight 4.5 g (including young): naked pouch young 1.0 cm long
17/5/58	F	Weight 5.0 g
2/3/59	M	Length 14.7 cm, tail 7.2 cm
	M	Length 15.6 cm, tail 7.2 cm:
8/3/59	F	Length 14.5 cm, tail 7.2 cm: 12 naked pouch young 0.55 cm long
21/3/59	F	Length 14.7 cm, tail 6.6 cm: 8 naked pouch young 0.8 cm long

It can be seen that no *P. ingrami* has been taken in tropical savannah woodland despite 251 trap-nights' work there, while the rate is one animal per 68 trap-nights in the pandanus fringe, and one animal per 119 trap-nights in paperbark fringe. Apparently therefore, whereas *P. ingrami* is common in the pandanus fringe it is less so in the paperbark fringe and possibly absent in the tropical savannah woodland. Probably it cannot live on the flood plain, which is inundated often to a depth of several feet, for up to six months of the year, but sight records indicate that it occurs on the higher patches where thorn scrub grows.

The animals appear to enter traps most readily between January and March, the catch averaging one animal per 58 trap-nights in that period (excluding trapping in tropical savannah woodland) and one animal per 504 trap-nights at other times. Presumably the animals are most active in the wet months; certainly no litters have been collected outside that period, whereas every female obtained within it has been either pregnant or carrying a litter. The only litter born in captivity was dropped about January 26th, 1958.

Melomys

This species has been taken at only one locality—a pandanus fringe habitat on the west side of the Adelaide River. A male and a pregnant female were collected there in February 1958 during 126 trap-nights, and a single adult male during 63 trap-nights in May of the same year. A young male (length 29.3 cm, tail 15.0 cm) was taken during 108 trap-nights in March 1959. In addition a sight record of several *Melomys* was made, 20 miles away, in pandanus fringe on the east side of the Adelaide River, in late May 1958. Since *Melomys* is an arboreal animal these results are probably not a true reflection of the population density, but they do suggest that *M. c. albiventer* is more restricted to pandanus fringe than *P. ingrami* and that it breeds in the wet season. The pregnant female dropped her litter of three on February 20, 1958, in captivity. The young mice, when raised in Canberra, bred first at the age of seven months, but it is possible that they would have bred earlier had the weather been warmer. Their three litters contained 3, 2 and 3 young.

Discussion

As has been pointed out above, both small mammals appear to be confined to the marginal areas lying between the flood plain and the tropical savannah woodland, occurring also on the isolated spots of high ground on the plain. A consideration of certain major environmental factors suggests an explanation of this distribution. The plain is annually flooded, and since neither of the animals is aquatic it is reasonable to suppose that the annual inundation is sufficient to prevent a population from becoming permanently established there.

The patches of thorn scrub on high ground might be expected to be populated, since they are both dry and isolated from fire by the swamps. On the other hand, the tropical savannah woodland is annually burnt out at the end of the wet season by fires that consume the undergrowth, leaving the trees alone standing. Such fires would probably be sufficient to wipe out any population of small mammals in the woodland, and thus prevent their permanent establishment. Although both fires and floods do occasionally reach the pandanus and paperbark fringes, these areas have features that might be expected to minimise their effects. As can be seen in Plate I, 1, clumps of young pandanus grow around the bases of older trees in the pandanus fringe, and form large tough thickets. The paperbarks, on the other hand, tend to grow on ground so damp (e.g. on drainage lines) that the grass never dries sufficiently for fires to obtain a proper hold. Possibly, however, the lower catching rate of *P. ingrami* in paperbark as compared with pandanus fringe reflects the fact that if a fire does burn through the former very little shelter remains for the small mammals, whereas in the pandanus fringe the pandanus clumps provide fire-resistant shelters large enough to shield them from the heat of the fire.

The distribution patterns of *P. ingrami* and *M. c. albiventer* at Humpty Doo may, therefore, be examples of the same situation as that reported in some Finnish birds by Sammalisto (1957), where each of two major habitats is unsuitable for a species, but the marginal areas between them provide suitable conditions for it. It will be of great interest to see whether any measures for flood or fire control taken during the development of the area affect the distribution of these animals.

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